Service Manual

ARGUS 60 M & ARGUS 100 M

Docking Station

Made in Switzerland

CE 0120

ARGUS Medical AG, CH-3627 Heimberg / Switzerland
(member of the CODAN group)

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1. INTRODUCTION

1.1. General

IMPORTANT!
This service manual is intended for the exclusive use of authorized persons who have been trained by ARGUS Medical AG in the maintenance and repair of the ARGUS 60 M & ARGUS 100 M docking station.
The service manual is meant to be used together with the 'User Manual'.

IMPORTANT!
ARGUS Medical AG shall not assume any responsibility for any manipulations which have been carried out on the ARGUS 60 M or ARGUS 100 M docking station by a non-authorized person.

IMPORTANT!
System V4: The ARGUS 60 M & ARGUS 100 M docking station with software version 4.30 only supports new ARGUS pump firmware versions beginning with v4.30.

IMPORTANT!
The reading of the barcode (medicament name and infusion data's on a syringe or a fluid bag) and the data transfer to the pump are fail save.
The data transfer from the ARGUS 60 M & 100 M docking station to a PC is fail safe only if the third party software and the PC hardware fulfills EN60601-1-1/-2/-4 itself. Please contact ARGUS for details & permission to connect.

CAUTION!
The ARGUS 60 M & ARGUS 100 M docking station may only be used with spare parts, accessories, pumps recommended by ARGUS Medical AG. The functional safety of the docking station is not guaranteed if non approved materials are used. The safety of the patient may be endangered.

This manual contains the latest data available. It is subject to further modifications in accordance with technical improvements.

2. DOCKING CONFIGURATION

2.1. General

CAUTION!
The configuration possibilities with the “ARGUS *service*” PC utility tool constitute a modification of the docking station and may only be carried out by authorized persons!

CAUTION!
After changing the configuration a functional check has to be performed!

2.2. Index list of the docking configuration (with ARGUS *service*)

Index PC	Default	Function	Unit	Range
1	No	Cascaded docking station	-	No / Yes
2	No	Cascaded docking station, MASTER	-	No / Yes
3	No	Barcode connected	-	No / Yes
4	No	This is an ARGUS 60 M docking station	-	No / Yes
5	No	Static nurse alarm relay	-	No / Yes
6	5	Buzzer alarm volume	volume	1 - 5
7	-	Customer department info text	text	16 chars
8	Yes	Current controlling alarm	-	No / Yes
440	0	Configuration PIN (**visible after login**)	-	-
396	0	ARGUS docking station serial number	**nnn T yww**	nnn T yww

Using the ARGUS service tool, the complete and detailed docking configuration can be done.

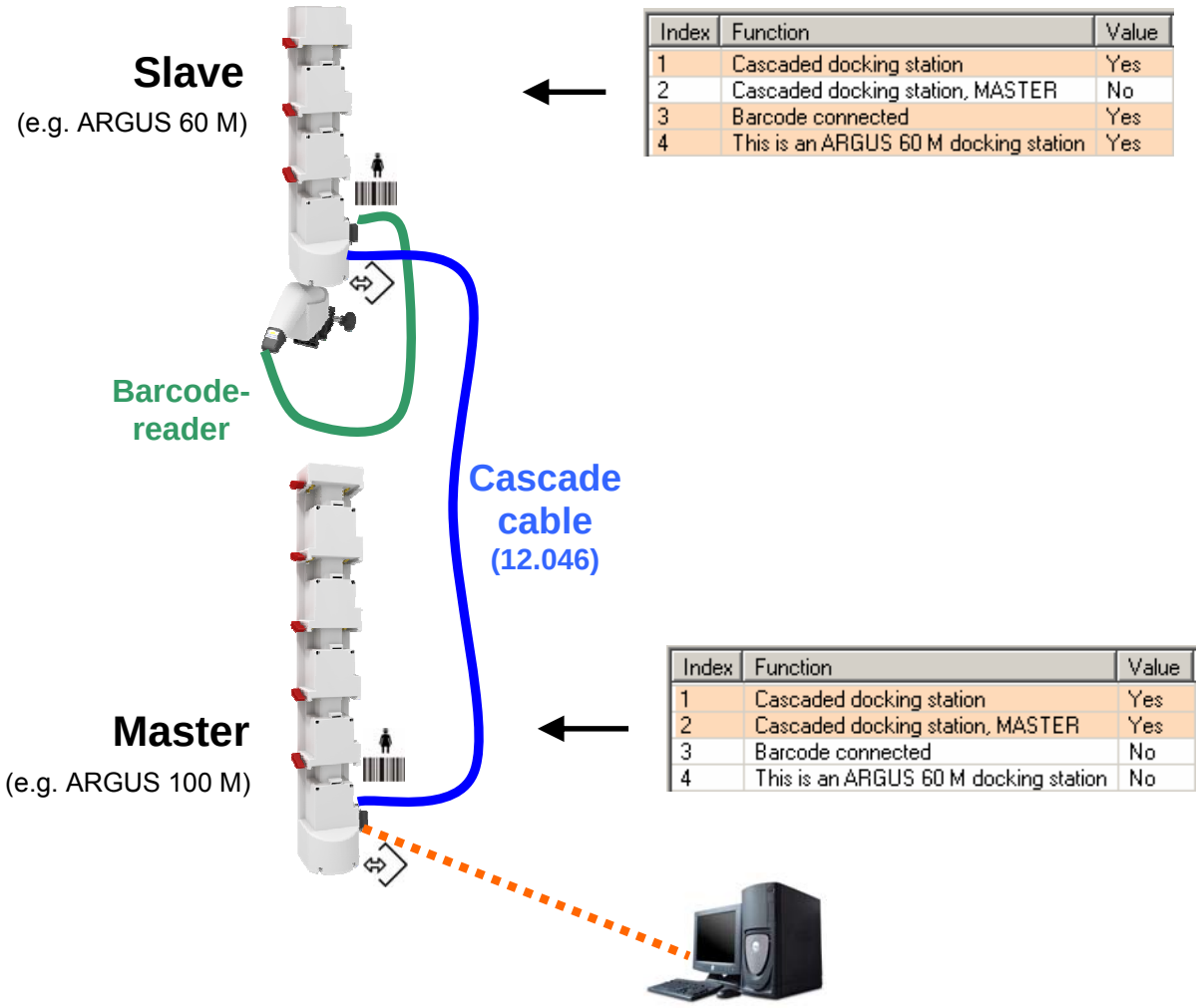
3. MASTER & SLAVE (CASCADE)

3.1. General

The system V4 firmware allows to cascade two docking stations (both either ARGUS 60 M or ARGUS 100 M). Thus many more combinations of pumps are possible and a single bar-code reader can be used to operate both docking stations.
With the ARGUS service configuration indexes # 1+2+3+4 you define a logical communication sequence:

(Personal Computer optional) → Master docking → Slave docking → (Barcode-Reader optional)

Example:



Index	Function	Value
1	Cascaded docking station	Yes
2	Cascaded docking station, MASTER	No
3	Barcode connected	Yes
4	This is an ARGUS 60 M docking station	Yes

Index	Function	Value
1	Cascaded docking station	Yes
2	Cascaded docking station, MASTER	Yes
3	Barcode connected	No
4	This is an ARGUS 60 M docking station	No

4. ARGUS SERVICE

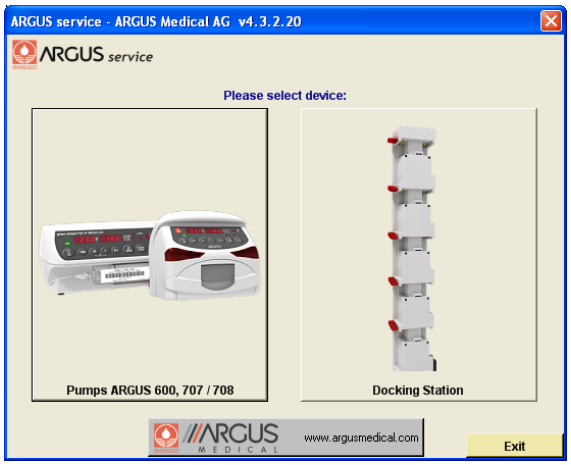
4.1. General

The new ARGUS *service* utility is a highly user friendly PC software which can configure and upgrade ARGUS devices over PC serial COM port. With this Windows based software you can also set pump clock, change PIN code, read and print out history and easily replicate pump configurations, and so on. The modern and clearly structured design of this self-describing PC-tool allows a very easy and rapid modification of the ARGUS 600 Syringe pump, the ARGUS 707 / 708 Volumetric infusion pump and the ARGUS 60 M / 100 M docking station. This software may be available from your local distributor or directly from ARGUS Medical.

REMARK:
"ARGUS *service*" may only be used with V4 software versions greater or equal to 4.30.

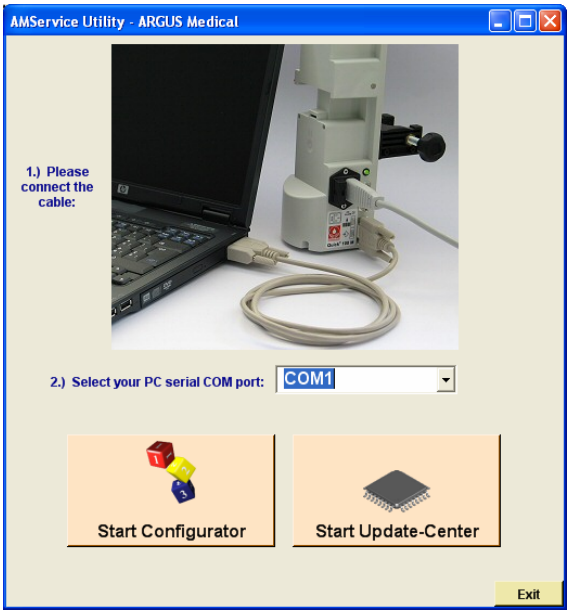
CAUTION!
The docking station has to be disconnected from the pumps before and while the serial interface cable is connected to the docking station.

Connect a straight RS-232 cable from the docking data interface ⇔ to the serial interface (COM port) of your PC.

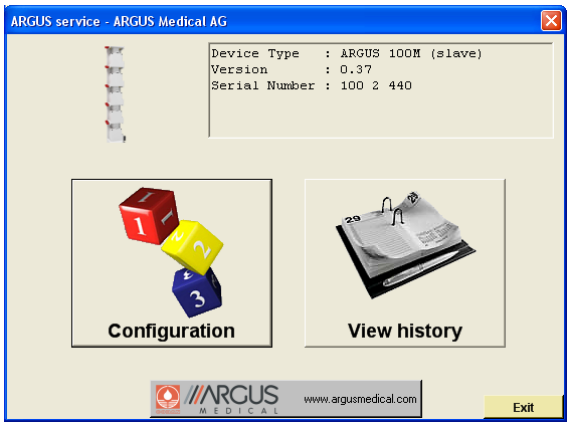


Start the ARGUS *service*

Press the '**Docking Station**' button.

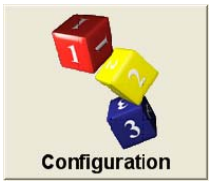


Select "Start Configurator" (*see next chapter*) or "Start Update-Center" (*see chapter 5.5.*).



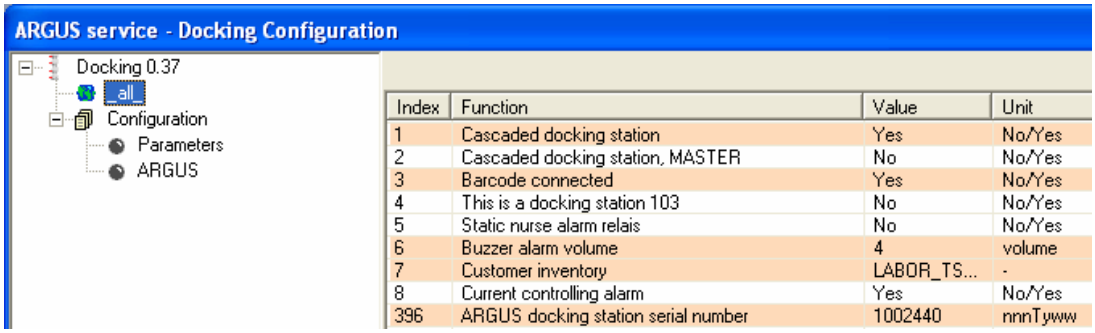
Select the next step by pressing one of the buttons (“Configuration” or “View history”).

4.2. ARGUS *service* – Configuration



Important remark:
After each configuration change,
a functional check has to be done!

4.2.1. Docking configuration



All configuration possibilities (indexes) mentioned in *chapter 2.2* can be modified herein in its own tree structure as shown above.
All indexes which are different from the ARGUS firmware default are highlighted.

CAUTION!
Every pump used with the ARGUS 60 M or ARGUS 100 M docking station has to be preconfigured with its corresponding serial number label!
Index #396 in the configuration of each pump must be programmed with the corresponding serial number. Please refer to the pumps respective service manual to change these indexes if necessary. In the case of an invalid serial number, the docking station will generate an alarm and the pump can not be programmed via barcode.

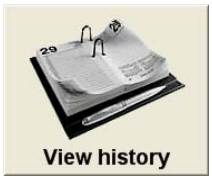
4.2.2. How to edit a configuration

The following procedure describes how to edit a docking configuration:

1. Press the green “Edit” button.
2. The software will ask for the docking PIN code as next. The button “Edit” changes its colour and will be renamed into “Download”.
3. If you want to import a configuration from a file press the “Import” button, otherwise skip this point (note: import does overwrite all settings including PIN and serial).
4. Select “Configuration” in the structure tree in the left upper frame.
5. Select the index group you want to modify by selecting the according structure tree and the according index.
6. Modify the according index (within the given restrictions shown).
   Each value (number) must be acknowledged by the green “Enter” button.
   Go through point 5 & 6 for all further indexes you want to modify.
7. Press the “Download” button if you want to save the modified configuration on the docking station. Otherwise you can save the modified configuration into a file by pressing the “Save” button.
8. **Make a functional check on each docking station you have configured.**

Important remark!
If a configuration has been edited (performed point 1 and 2) once do not disconnect the docking station! Otherwise the docking station will remain in the PC-configuration mode.

4.3. ARGUS service - Docking history



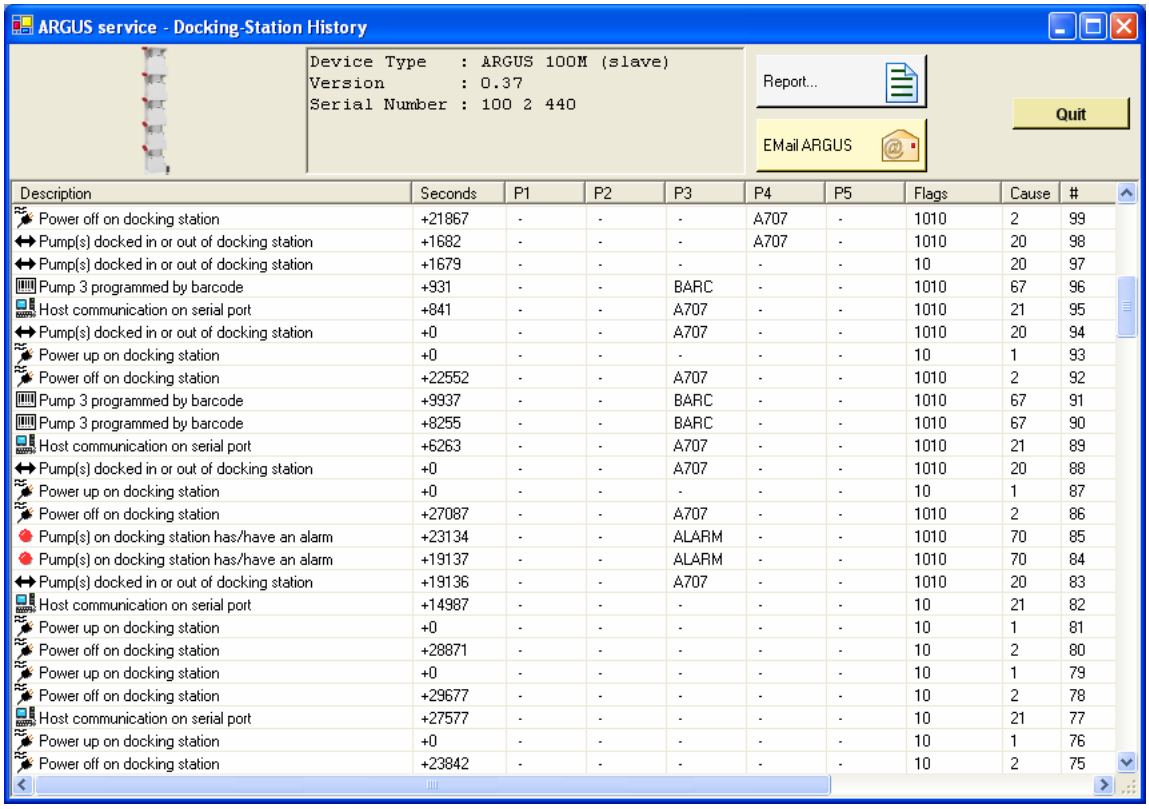
Each registered event has its own date & time stamp. An event is registered on each docking status change. Please refer to the complete list mentioned in *chapter 4.3.1* below.

4.3.1. History messages

Possible messages appearing in the description of each history event:

"No information available"
"Power up on docking station"
"Power off on docking station"
"Enter PC configuration mode"
"Logon in PC configuration mode"
"Logoff in PC configuration mode"
"Docking has detected failure F-XX"
"Host communication on serial port"
“Pump(s) docked in or out of docking station"
"Pump(s) on docking station has/have failure"
"Pump 1 programmed by barcode"
"Pump 2 programmed by barcode"
"Pump 3 programmed by barcode"
"Pump 4 programmed by barcode"
"Pump 5 programmed by barcode"
"Pump(s) on docking station has/have an alarm"
"Pump(s) on docking has/have invalid serial number"

4.3.2. History printout example



Description	Seconds	P1	P2	P3	P4	P5	Flags	Cause	#
Power off on docking station	+21867	-	-	-	A707	-	1010	2	99
Pump(s) docked in or out of docking station	+1682	-	-	-	A707	-	1010	20	98
Pump(s) docked in or out of docking station	+1679	-	-	-	-	-	10	20	97
Pump 3 programmed by barcode	+931	-	-	BARC	-	-	1010	67	96
Host communication on serial port	+841	-	-	A707	-	-	1010	21	95
Pump(s) docked in or out of docking station	+0	-	-	A707	-	-	1010	20	94
Power up on docking station	+0	-	-	-	-	-	10	1	93
Power off on docking station	+22552	-	-	A707	-	-	1010	2	92
Pump 3 programmed by barcode	+9937	-	-	BARC	-	-	1010	67	91
Pump 3 programmed by barcode	+8255	-	-	BARC	-	-	1010	67	90
Host communication on serial port	+6263	-	-	A707	-	-	1010	21	89
Pump(s) docked in or out of docking station	+0	-	-	A707	-	-	1010	20	88
Power up on docking station	+0	-	-	-	-	-	10	1	87
Power off on docking station	+27087	-	-	A707	-	-	1010	2	86
Pump(s) on docking station has/have an alarm	+23134	-	-	ALARM	-	-	1010	70	85
Pump(s) on docking station has/have an alarm	+19137	-	-	ALARM	-	-	1010	70	84
Pump(s) docked in or out of docking station	+19136	-	-	A707	-	-	1010	20	83
Host communication on serial port	+14987	-	-	-	-	-	10	21	82
Power up on docking station	+0	-	-	-	-	-	10	1	81
Power off on docking station	+28871	-	-	-	-	-	10	2	80
Power up on docking station	+0	-	-	-	-	-	10	1	79
Power off on docking station	+29677	-	-	-	-	-	10	2	78
Host communication on serial port	+27577	-	-	-	-	-	10	21	77
Power up on docking station	+0	-	-	-	-	-	10	1	76
Power off on docking station	+23842	-	-	-	-	-	10	2	75

5. SOFTWARE UPDATES

5.1. General

This chapter describes the procedure to perform software (firmware) updates on the ARGUS 60 M and/or 100 M docking station.

To check the currently installed software release in your docking station:

- With versions 1.x (pre-V4), you can either read out the history or enquiry the docking station's status over the serial interface (*see older manuals*).
- With versions 4.x (V4), you can use the ARGUS *service* tool.

Please refer to your local distributor or ARGUS Medical AG to determine the latest software release available to run on your device hardware.

The ARGUS 60 M & 100 M contains a flash memory which can be updated easily via the serial interface of a PC. This flash memory is divided in 2 sectors:

- User Program sector - Boot loader sector

The User Program sector contains the program which runs when the device is switched on normally. The Boot loader sector contains a supportive program which runs only when updating the flash memory.

5.2. Requirements for a software update

To update an ARGUS Medical device, the following items are needed:

- PC with Microsoft® Windows™ 2000/XP or newer, the Microsoft .NET Framework 2.0 must be installed!
- PC configuration tool "ARGUS *service*"
- A straight RS-232 serial interface cable (*REF* 12.041), **connected to the data interface (lower plug)**
- Latest firmware ('user program'), either as a file (A100_Vxxx.txt), ("xxx" is the placeholder for the firmware version) or embedded inside ARGUS *service* (this embedded version might be older, ask for a newer ARGUS *service*).

Those items are available from your local distributor or from ARGUS Medical AG.

5.3. Software update procedure

5.3.1. General

Please carefully check the software presently installed on the docking. If you have a firmware lower than version 4.xx please follow *chapter 5.4* to upgrade the firmware.

NOTE!
The user program performs an internal ROM-Test during the self test phase of the docking station. If an error occurred during the update process the device will enter the fail safe state (for fault codes please refer to *chapter 8.2*).
Please contact your local distributor or ARGUS Medical AG to determine the latest software release able to run on your device hardware.

5.3.2. Safety aspects

Be aware of the following points:

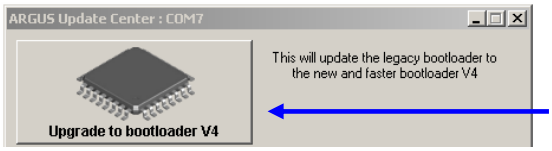
- Never make any software updates while the device is used and/or connected to a patient!
- For medical device traceability your local distributor or ARGUS Medical AG needs to be informed about every device updates (serial number) you performed!
- Connect the docking station to the mains supply.
- Do not disconnect the data cable during the software update process!

CAUTION!
A standard safety check *(see chap.12)* has to be performed after a software update!

5.4. Upgrade of a docking station from 1.x to V4

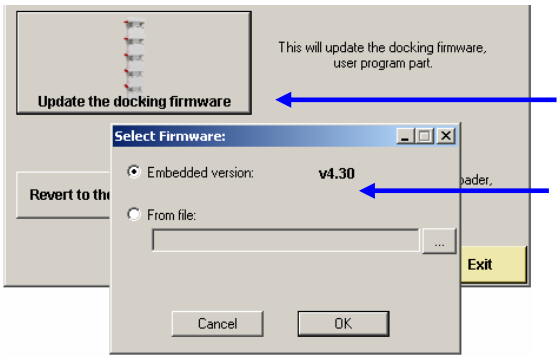
With the “Update center” it’s also possible to *upgrade* the docking firmware to V4.

Use a crossed serial interface cable (or a null-modem adapter *REF* 12.050), connected to the barcode interface (upper plug).


ARGUS Update Center : COM7
This will update the legacy bootloader to the new and faster bootloader V4
Upgrade to bootloader V4

1. Launch the ARGUS service “Update center” (*see chapter 4.1*).
2. Press “Upgrade to bootloader V4” and follow the instructions displayed on the PC. The bootloader will be upgraded.

Use a straight RS-232 serial interface cable (*REF* 12.041), connected to the data interface (lower plug)



3. Press “Update the docking firmware”. Follow the instructions displayed on the PC.
4. Select the appropriate firmware source.
5. The new firmware will be installed.

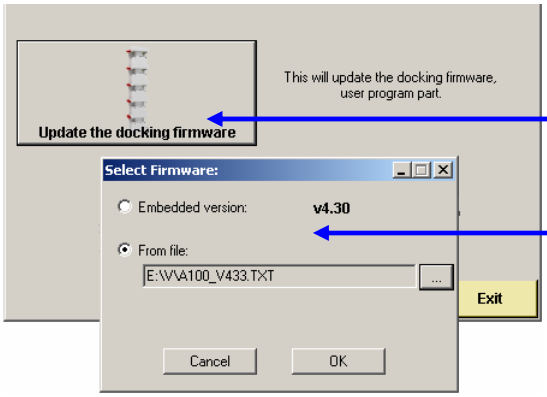
Important:

- All previous settings are **lost** during this upgrade procedure! Thus you will have to reconfigure them with ARGUS *service*.
- Finally, perform a standard safety check (*see chapter 12*).

5.5. Minor Firmware Update with V4

A minor update is a newer firmware version where only the lowest digit changes.

For example: minor update = 4.30 to 4.33 (major update = 4.30 to 4.40)



1. Launch the ARGUS service “Update center” (*see chapter 4.1*):
2. Press "Update the docking firmware". Follow the instructions displayed on the PC.
3. Select the appropriate firmware source.
4. The new firmware will be installed.

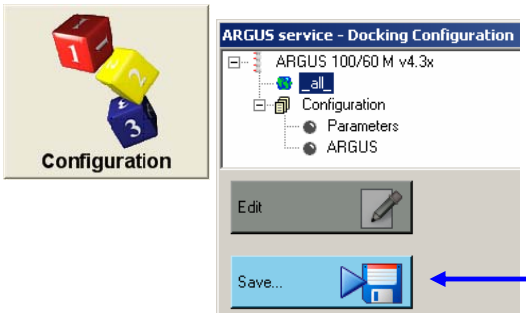
Important:

- All your settings will be preserved.
- Finally, perform a standard safety check (*see chapter 12*).

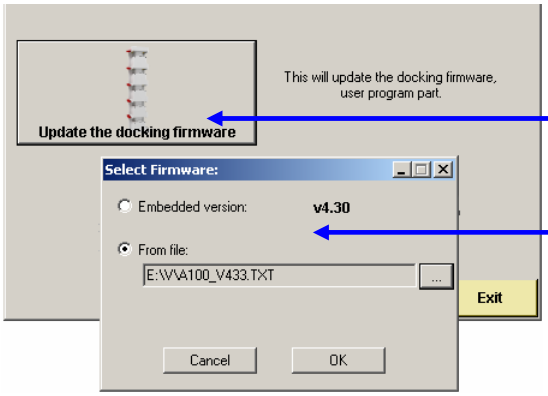
5.6. Major Firmware Update with V4

A major update is a newer firmware version where upper digit changes.

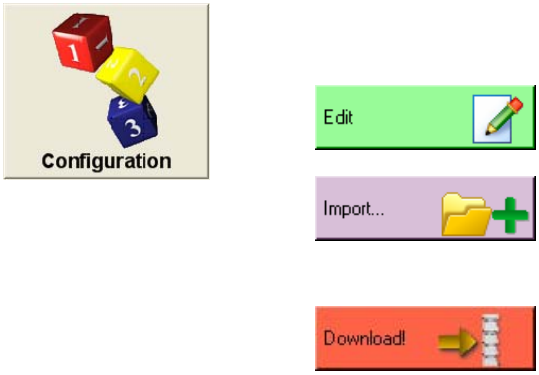
For example: major update = 4.30 to 4.40 (minor update = 4.30 to 4.33)



1. Launch the ARGUS service “Configurator” (*see chapter 4.1*):
2. Use the ‘Save’ button to store your full configuration in a file on disk.



3. Launch the ARGUS service “Update center” (*see chapter 4.1*):
4. Press "Update the docking firmware". Follow the instructions displayed on the PC.
5. Select the appropriate firmware source.
6. The new firmware will be installed.



7. Launch the “Configurator” again (some warnings will be shown)
8. Click ‘Edit’ and enter PIN (default = 0)
9. Click ‘Import’ and select the file you saved in step 2.
10. Review all your settings for correctness.
11. Download, then quit ARGUSservice.

Important:

- Finally, perform a standard safety check (*see chapter 12*).

6. BARCODE READER AND LABEL DATA

6.1. General

The barcode reader "ScanPlus 1800 VT" (Intermec) including a gender changer may be ordered from ARGUS (*REF* 90.150). It should be connected to the appropriate plug of the ARGUS 60 M or ARGUS 100 M docking station marked with the sign:

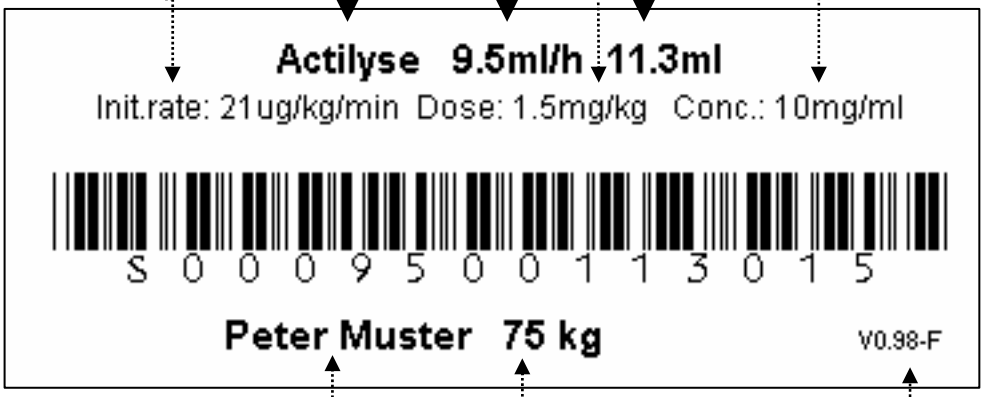
CAUTION!
The barcode reader "ScanPlus 1800 VT" has been preconfigured and tested by ARGUS for the use with the ARGUS 60 M and/or ARGUS 100 M docking station v4.30

6.2. Label layout

ARGUS Medical recommends to use its own Excel tool named “Medication Barcode Labels” to generate these barcode labels and bar-coded prescription sheets.

A medication barcode label holds the following relevant information:

1. The Medication concentration in the programmed unit
2. **The dose (ml total) in ml**
3. The dose in the programmed unit
4. **The infusion rate in ml/h**
5. **The medication name**
6. The initial rate in the programmed unit



7. The patient name
8. The patient weight in kg
9. A software version and an ARGUS check number

6.3. Barcode format

The used barcode standard corresponds to code 3 of 9 including check digit.
The barcode format is:

*	T	Rate 1E3	Rate 1E2	Rate 1E1	Rate 1E0	Rate 1E-1	Dose 1E3	Dose 1E2	Dose 1E1	Dose 1E0	Dose 1E-1	Med. HEX High digit	Med. HEX low digit	CD	*

T = Pump Type: “S” for syringe pump, “V” for volumetric pump
Med. = Medication number in HEX format (see pump service manual for details)
CD = Modulo 43 checksum digit.

7. SERIAL COMMUNICATION OF THE DOCKING

7.1. General

The ARGUS 60 & 100 M docking station has one serial interface on board, which is connected to the RS232 data connector.

Important remark!
This RS232 connector is galvanic isolated, but the docking slots for the pumps are non-isolated interfaces. So if a pump is docked into the docking station, the software switches automatically to the docking interface and the docking station builds the separation device (galvanic isolation) then.

7.2. Serial communication protocol V4

The following characteristics are basics for all the ARGUS devices (volumetric pumps, syringe pumps and docking stations with V4.xx):

- Full-duplex RS232, currently 4800 baud for single pumps,
  9600 baud for docking stations (also on master/slave-link).
- Simple master (host/PC) – slave (device) communication (host does polling).
- The host has to repeat the request if there is no valid response.
- Uses a checksum (CRC-8).
- Binary data transmission, thus no ASCII/text parsing.
- Fast & direct communication with pumps on ARGUS docking station.
- Specified timeouts during remote mode.

A Programmer's Kit with documentation is available on request from ARGUS.

7.3. Monitoring

The interface protocol of software release V4 is intended to be used in combination with a PDMS (Patient Data Management System). For visualization and documentation purposes, the status of each docked-in pump and the status of the docking station itself can be requested through the serial interface.

CAUTION!
Those PC transmitted data are not intended to be used for diagnostic or remote controlling of the pumps or other devices.

7.4. Remoting

Future extensions will allow remote controlling of the pumps. This requires written permission from ARGUS Medical.

8. MAINTENANCE AND FAULT FINDING

8.1. General

CAUTION!
Only authorized persons who have been trained by ARGUS Medical AG or by the local distributor are allowed to service the ARGUS 60 M and/or ARGUS 100 M docking station. In case of repair request, send the unit with the filled out “repair order form” *(see chapter 13)* to the local distributor. Further information is available from:

ARGUS Medical AG
CH-3627 Heimberg / Switzerland
E-mail: info@argusmedical.com

CAUTION!
The safety standard check (SSC) has to be performed at least every 24 month or after 10'000 hrs of operation. The check has to be done in accordance to the *chapter 12* .
No special maintenance of the ARGUS 60 M & ARGUS 100 M docking station is necessary. There are no wear and tear parts.

8.2. Fault code

The fault code in case of a technical failure is displayed in the history file, refer to *chapter 4.3* . The possible fault codes registered in the history event log file are listed in the table below:

```
Fault       Failure:
Code:

00..Internal hardware and software issues
20  Internal hardware and software issues
21  ROM test
22  ROM check (Runtime)
23  RAM test/check
24  XRAM test/check
25  CPU test
27  EEPROM data invalid
28  Switcher for RS232 power supply test failed
32  5 Volt supply out of range
33  20 Volt supply out of range
34  Power supply voltage control out of range (VIN)
41  Pump1 supply: no comm. at powerup/dock-in
42  Pump2 supply: no comm. at powerup/dock-in
43  Pump3 supply: no comm. at powerup/dock-in
44  Pump4 supply: no comm. at powerup/dock-in
45  Pump5 supply: no comm. at powerup/dock-in
50  Address invalid for history-eeprom
51  Pump1 supply: communic.lost while docked
52  Pump2 supply: communic.lost while docked
53  Pump3 supply: communic.lost while docked
54  Pump4 supply: communic.lost while docked
55  Pump5 supply: communic.lost while docked
```

Exceptionally a fault code not listed above may appear. In this case we recommend changing the main board.

9. REPLACEMENT OF PARTS

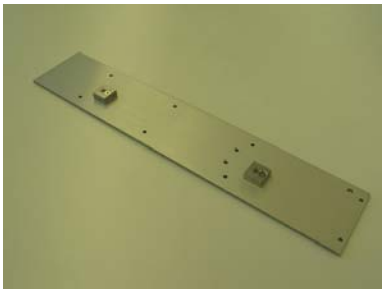
9.1. General

CAUTION!
The ARGUS 60 M & 100 M docking station may only be used with accessories and spare parts which have been approved by ARGUS Medical AG for safe technical use.

9.2. Disassembling of the docking station

CAUTION!
Disconnect the mains cable from the power outlet before opening the housing!
Observe the antistatic protection rules when disassembling the ARGUS 60 M or ARGUS 100 M docking station (the use of an antistatic table mat and a grounded clip are recommended).

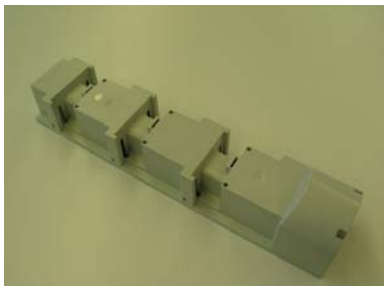
9.3. Spare parts



10.169 Cover for ARGUS 60 M

12.041 RS232 Interface cable
(docking - PC)

12.043 Gender Changer m/m
(docking - Barcode-Reader)



11.297 Casing for ARGUS 60 M

12.046 RS232 Cascade cable
(docking - docking)

12.050 Null Modem Adapter

11.215 Casing for ARGUS 100 M

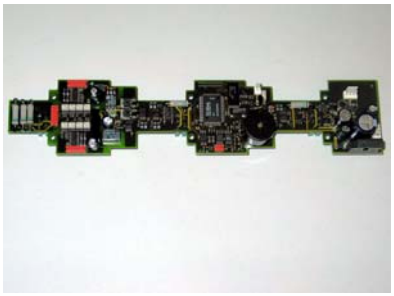
10.114 Cover for ARGUS 100 M

10.096 Voltage regulator

10.087 Combination clamp

10.095 Extended board (100M only)

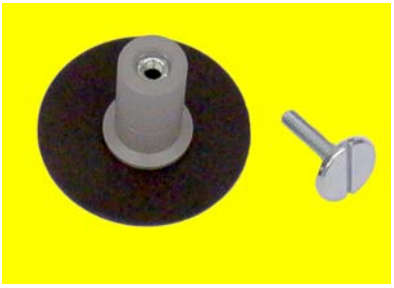
10.097 Transformer 230V



10.115 Main board 60&100M

10.116 Flat cable set 60&100M

10.130 Barcode holder with clamp

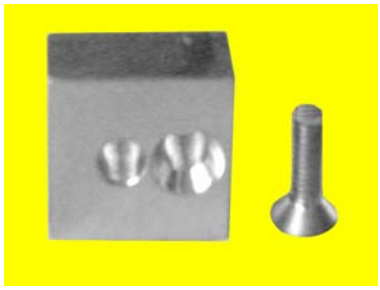


11.214 Transformer holder

11.216 Handle with axle

11.217 Locking device

11.218 Coil spring

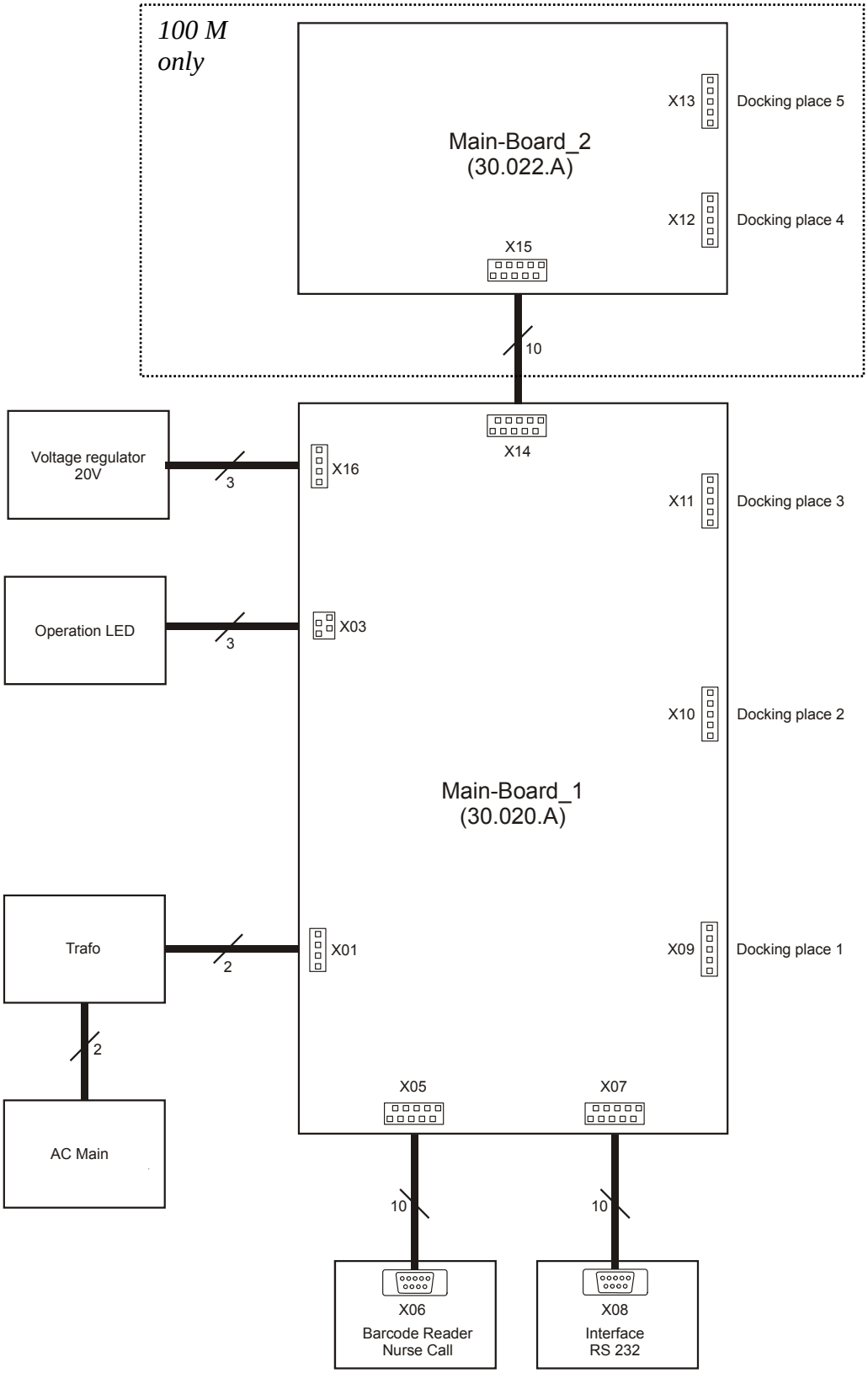


11.220 Centring fixation

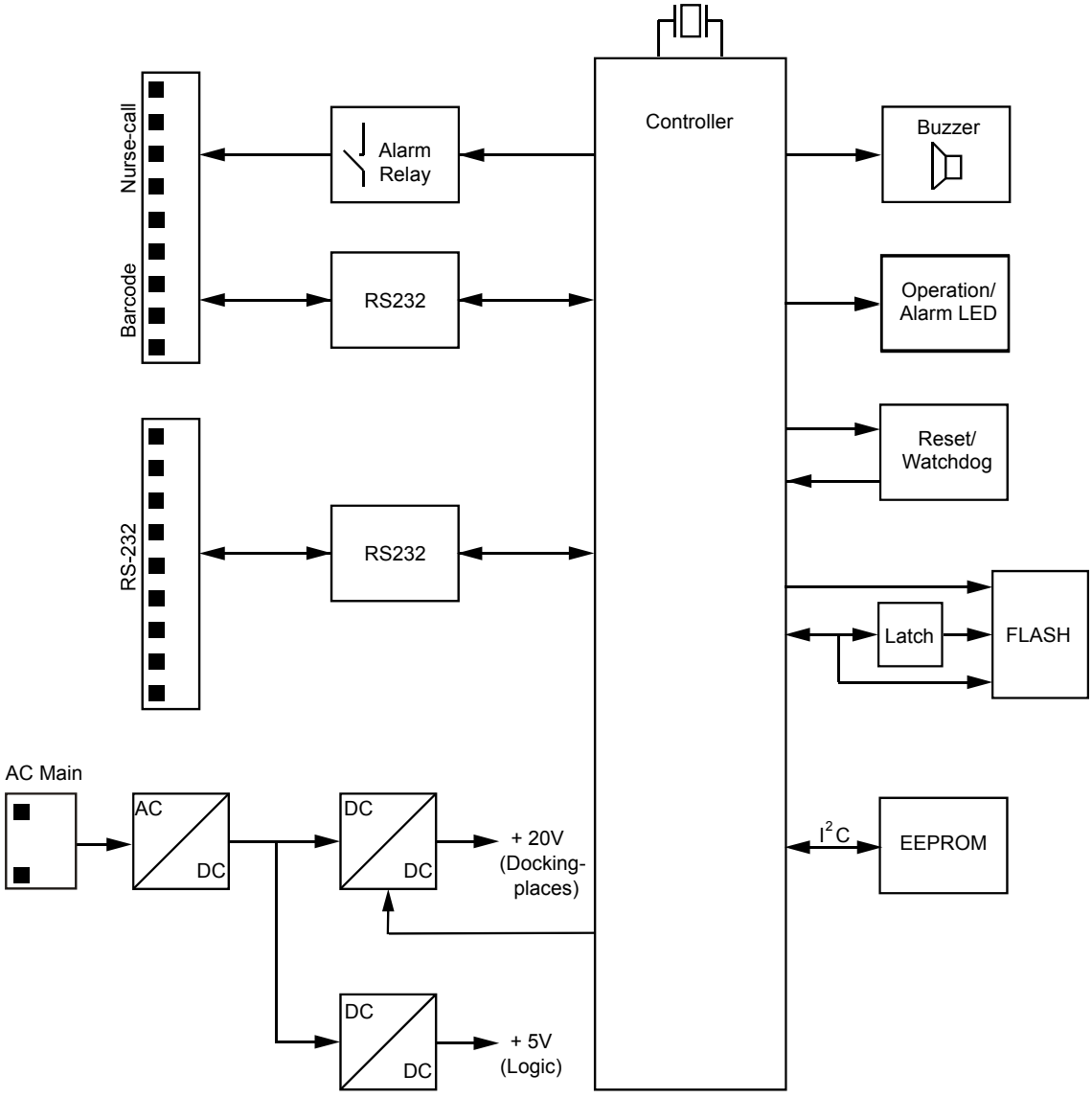
12.008 Mains plug with filter

90.041 Rail set (25x10mm)
90.042 Rail set (35x 8mm)

10. WIRING DIAGRAM



11. BLOCK SCHEMATIC



12. SAFETY STANDARD CHECK

Safety standard check **ARGUS 60 M & ARGUS 100 M** **ARGUS Medical AG**

Serial-No.: _____

Hospital/Dept/Customer: _____

_____

The safety standard check has to be performed at least every 24 months or after 10000 hours of operation.
The check has to be done in accordance to the operation and service manual.

1 Visual check for damage, cleanness and completeness:	- Housing, labels, accessories, connectors, cables, etc..?	
2 Plug in the mains of the docking station	- The green LED on the docking station lights up?	
3 Check each docking position with a pump:	- Mechanical locking and unlocking ok ? - After docking the pump, its green power LED lights up? - Docking buzzer sounds twice, ok? - LED on docking station flashes orange-red, ok?	
4 Check the external connections:	- Computer interface ? - Barcode reader interface ? - Staff alerting system ?	
5 Electrical test according to EN60601-1: **Do not install any pump!** All measurements made with a 2.5 m power cord	- Measurements attached?	
6 The docking station has passed the safety standard check and is safe for use.		

Date: _____ Name: _____ Signature: _____

13. REPAIR ORDER FORM

ARGUS Medical AG / Heimberg Switzerland
REPAIR ORDER FORM

Purchase order / Proforma invoice number:

Customer name and address:

Name of contact person: Tel. number:

Device:

A414	☐	ARGUS 60 P / 100 P	☐	
A400	☐	ARGUS 60 M / 100 M	☐	
A404	☐	ARGUS 600 S	☐	
A200	☐	ARGUS 707 V	☐	
A300	☐	ARGUS 708 V	☐	Serial Number:

Accessory: Serial Number / Production code:

Detailed failure or problem description:

Expected work / repair to be done:

Repair	☐	
Warranty repair	☐	
Replacement	☐	
Other	☐	Description:

Date: Signature: